

# BULLETIN

# ZOÖLOGISCH MUSEUM

U N I V E R S I T E I T V A N A M S T E R D A M

Vol. 11 No. 16 1988

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FIRST REPRESENTATIVE OF THE FAMILY PARASTENOCARIDIDAE FROM SICILY (ITALY),  
AND DESCRIPTION OF TWO NEW SPECIES OF *PARASTENOCARIS* KESSLER  
(CRUSTACEA COPEPODA: HARPACTICOIDA) (\*) (\*\*)

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## ABSTRACT

Representatives of the family Parastenocarididae (Chappuis) are for the first time reported from Sicily (Italy), and *Parastenocaris trinacriae* n.sp. and *Parastenocaris kalypso* n.sp. are described. The new species belong to the "minuta-group" and "proserpina-group" of Lang (1948), respectively the former being close to *P. orcina* Chappuis, widespread in groundwaters of central and southern Italy, the latter to *P. proserpina* Chappuis and *P. ruffoi* Chappuis, reported from interstitial substrates of central-southern Italy and Venetia (north Italy), respectively.

Among the large number of harpacticoid copepods, collected from different groundwater habitats, during a sampling programme of the stygofauna of Sicily (Italy), representatives of the family Parastenocarididae (Chappuis) were recorded for the first time from this region.

Included among these were two undescribed species of the genus *Parastenocaris* Kessler, herein described as *Parastenocaris trinacriae* n.sp. and *Parastenocaris kalypso* n.sp..

## Material and methods

Samples were taken from fresh-water wells in the western karst of the island, with the aid of modified (Cvetkov) plankton nets, with nylon gauze 120 HD, and fixed in 5% neutralized formalin; harpacticoid copepods were sorted and preserved in 75% ethyl alcohol. Dissected specimens were mounted in Faure's medium. Drawings and measurements were made using a Wild microscope with a drawing-tube attachment.

The following abbreviations are used throughout the text and figures: A1= antennulae; A2= antennae; P1-P6= legs 1 to 6; Ti= inner apical, furcal seta; Te= outer apical, furcal seta.

Holotypes and 6 paratypes are deposited at the "Dipartimento di Scienze Ambientali", University of L'Aquila, Italy (senior author's collections); 1 paratype of each species, deposited in the collection of the Zoölogisch Museum, Amsterdam, Netherlands (ZMA).

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(\*) Contribution to the knowledge of the underground water fauna in central and southern Italy: XLII.

(\*\*) Research supported by grants from M.P.I. (40%) and C.N.R. - "Gruppo Nazionale di Biologia Naturalistica".

Family Parastenocarididae Chappuis, 1933

Genus *Parastenocaris* Kessler, 1913

*Parastenocaris trinacriae* n.sp.

(Figs. 1-15)

**Material**

1♂ (holotype) and 3♀♀ (paratypes), fresh-water well n.SI/86, Petrosino (Trapani) (water level from the soil surface: 10.5 m; water depth: 3.5 m; water temperature: 18.5 °C; pH: 7.0; bottom sediment composed of thin organogenic sandstone detritus); accompanying fauna: cyclopoid copepods, ostracods, syncarids, water mites, gastropods; 27 Aug. 1987, coll. G. Di Giambattista & L.D'Agruma. 3♀♀ (paratypes), fresh-water well n.SI/87, Castelvetrano (Trapani) (water level from the soil surface: 4.5 m; water depth: 1.5 m; water temperature: 20.5°C; pH: 6.7; bottom sediment composed of organogenic sandstone); accompanying fauna: cyclopoid copepods, ostracods, syncarids, water mites; 7 Aug. 1987, coll. G. Di Giambattista & L.D'Agruma (1 paratype ZMA Co. 102.809).

**Description**

Small and slender harpacticoid; mean total length, excluding A1 and furcal setae, 362 µm (n=6) (♀♀), 334 µm (♂ holotype). Anal operculum slightly convex posteriorly, with two rows of hair-like elements on the distal margin. Furcal rami elongated, length/width ratio 3.33-3.35 (♀♀), 3.6 (♂); armature consisting of 2 small lateral setae, one dorsal, short seta and 3 apical setae; Ti longer than Te, length ratio 1.20-1.31 (♀♀), 2.10 (♂); medial seta the longest.

A1, 7 segmented, aesthete on segment 4 reaching the top of the distal segment; A2, exopod 1-segmented, bearing a slender, apical seta.

P1 identical in both sexes: endopod 2 segmented, basal segment without developed internal spines or setae, top segment with two elements; exopod 3-segmented, basal segment with spine, middle segment bare, top segment with four elements.

P2 (male): exopod 3-segmented, basal segment with one strong, outer spine, segment 2 without armature, top segment with 2 apical and one subapical setae; endopod 1-segmented, with four apical setiform elements; a sexual dimorphism is seen in the setiform spine on the basal segment of the female exopod (spiniform in male).

P3 (male): apical segment slender and tapering towards its long apex, with 2 strong spines on the middle, inner side; basal segment with a row of 6 slender setae. P3 (female): exopod 2-segmented, apical segment with 2 elements (1 spine and 1 seta), basal segment with one outer subapical spine; endopod 1-segmented, about as long as the basal segment of the exopod.

P4 (male): exopod 3-segmented, basal segment with one outer spine, segment 2 naked, segment 3 with 2 apical elements; endopod 1-segmented, with one strongly denticulate apical spine; basipodite armed with 2 setae and one strong spine. P4 (female): exopod as in the male; endopod long and narrow, with one apical long spine.

P5 (male): a subtriangular pointed plate, with 4 setae, the proximal one the longest. P5 (female) triangular shape more pronounced than in male, armature as in male.

**Etymology**

Named after the ancient name of Sicily: Trinacria.

**Affinities**

*P. trinacriae* n.sp., owing to the construction of both the endopod and basipodite of male P4, well fits the *minuta*-group of species (Lang, 1948). Within this group, the present new species most closely resembles *P. orcina* Chappuis, widespread in central and southern Italy, in having a similar endopod of P4 and similar armature of P5, both in male and female.

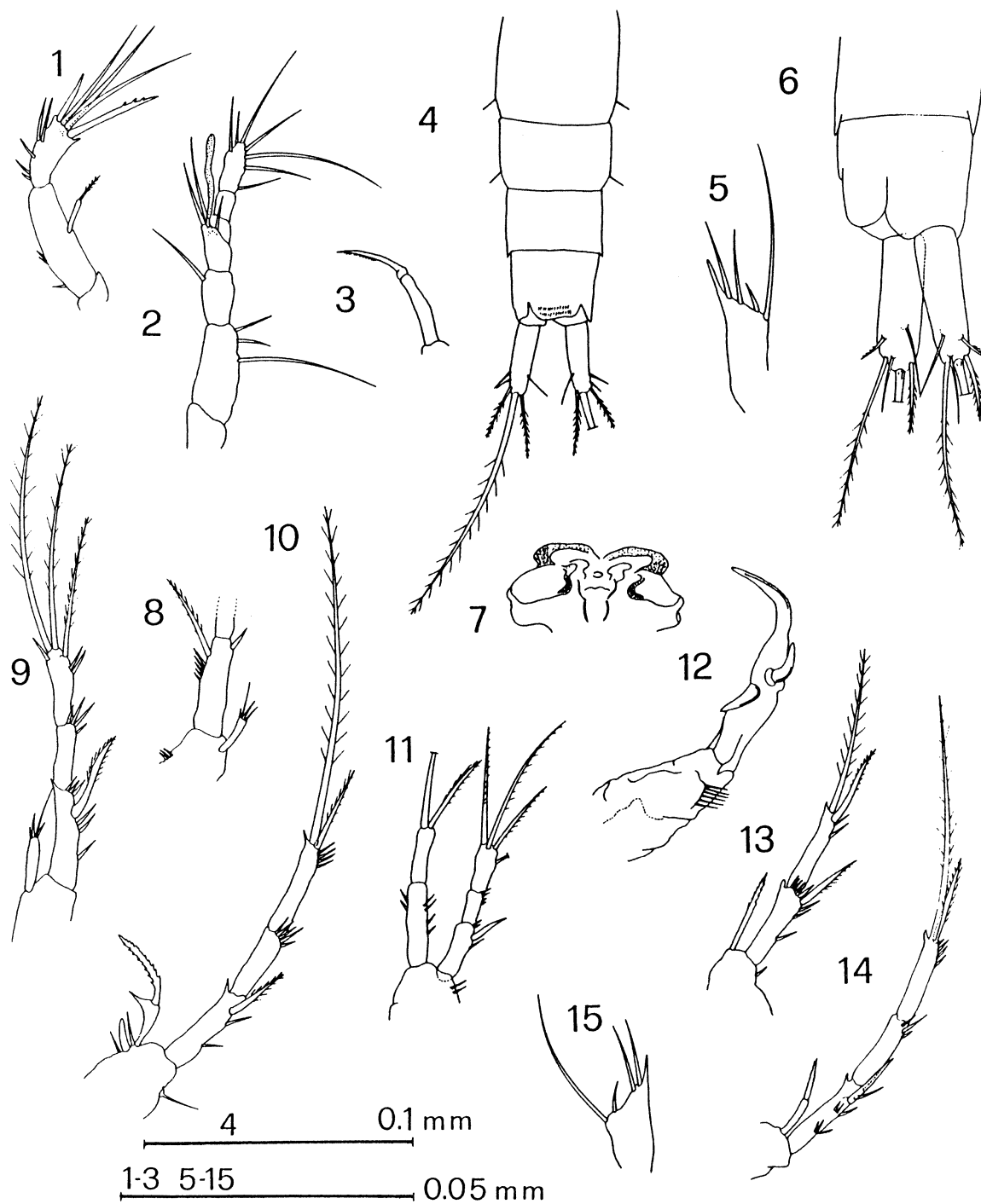
*P. trinacriae* n.sp., however, is distinguished from the above species, as well as from its congeners in the same group, by the construction and armature of male P3 and by the morphology and length of the endopod of female P3.

*Parastenocaris kalypto* n.sp.

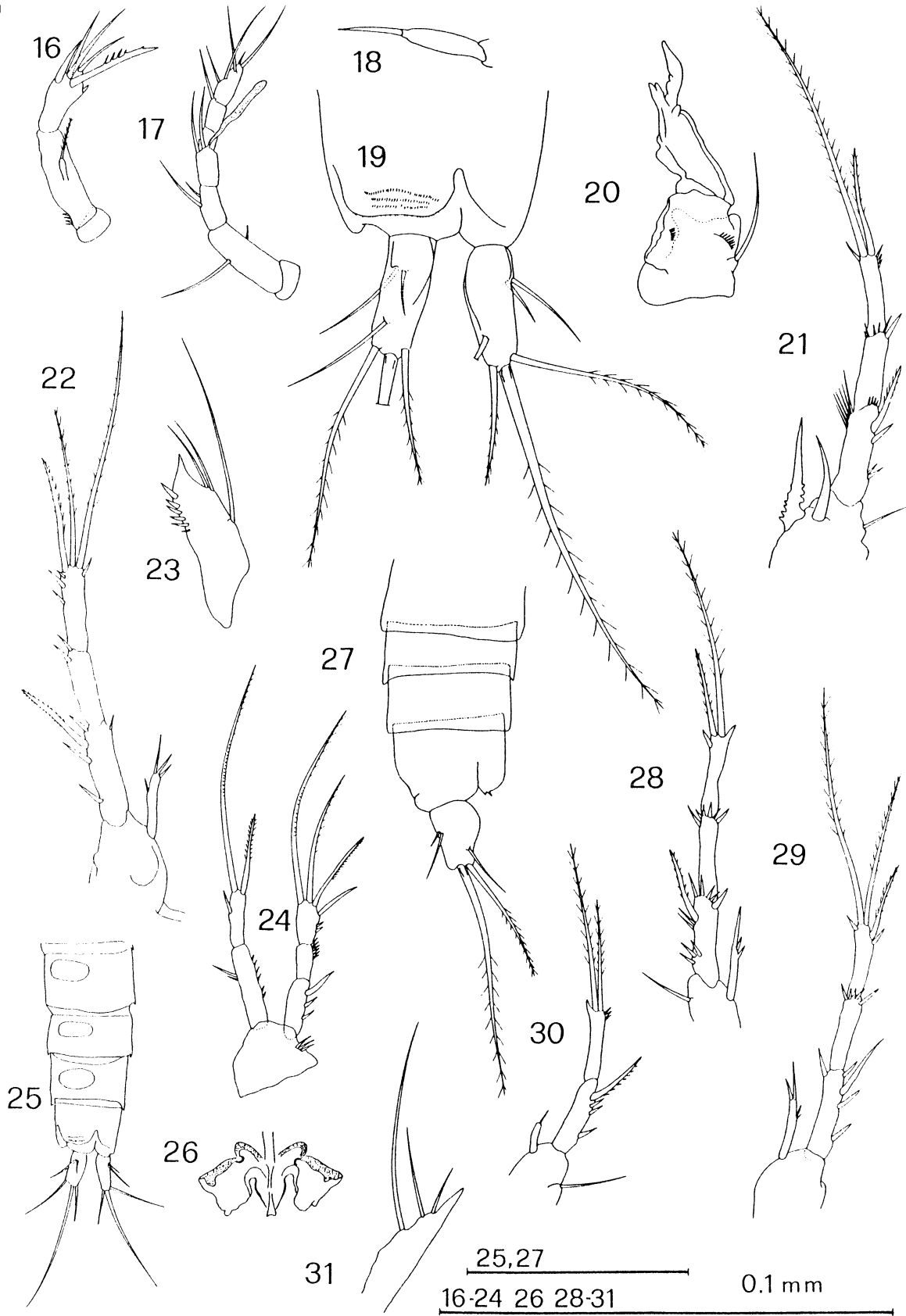
(Figs. 16-31)

**Material**

1♂ (holotype) and 1♀ (paratype), fresh-water well n.SI/86 (same data as for *P. trinacriae* n.sp.); 1♂ (paratype), fresh-water well n.SI/85, Petrosino (Trapani) (water level from the soil surface: 14.5 m; water depth: 2.5 m;



Figs. 1-15. *Parastenocaris trinacriæ* n.sp. 1, A2; 2, A1; 3, maxilliped; 4, abdomen and furcal rami (female), dorsal view; 5, P5 (male); 6, furcal rami (male); 7, "genital field"; 8, P2 (female), endopod; 9, P2 (male); 10, P4 (male); 11, P1; 12, P3 (male); 13, P3 (female); 14, P4 (female); 15, P5 (female).



Figs. 16-31. *Parastenocaris kalypto* n.sp. 16, A2; 17, A1; 18, maxilliped; 19, furcal rami (female); 20, P3 (male); 21, P4 (male); 22, P2 (male); 23, P5 (male); 24, P1; 25, abdomen and furcal rami (female), dorsal view; 26, "genital field"; 27, abdomen and furcal rami (male), lateral view; 28, P4 (female); 29, P2 (female); 30, P3 (female); 31, P5 (female).

water temperature: 20.0°C; pH 6.8; bottom sediment: clay and sandstone); accompanying fauna: cyclopid copepods, ostracods, isopods, syncarids, gastropods, water mites; 27.VIII.1987, coll. G. Di Giambattista & L. D'Agruma (paratype ZMA Co. 102.808).

## DESCRIPTION

A middle sized, slender species; total length, excluding A1 and furcal setae, 454  $\mu\text{m}$  (holotype), 375  $\mu\text{m}$  (male paratype) and 400  $\mu\text{m}$  (female paratype). Anal operculum slightly convex, armed with 4 rows of cilia. Furcal rami sexually dimorphic: much longer and subcylindrical in the female (length/width ratio: 2.7), short and proximally enlarged in the males (length/width ratio: 2.1-2.3); armature similar in both sexes: outer margin with 2 setae of different length, proximally implanted, the shorter is half as long as the longer one, which, in turn, is of the same length of the dorsal one; distal margin with 3 setae, the medial the longest. A1, 7-segmented, esthete on segment 4 well reaching the tip of the distal segment. A2, exopod 1-segmented, bearing a long, distal plumose seta.

P1 identical in both sexes: endopod 2-segmented, basal segment with internal spine, top segment with 2 elements; exopod 3-segmented, basal segment with outer, subapical spine, middle segment bare, top segment armed with 4 elements.

P2 (male): exopod 3-segmented, basal segment with one, well developed spine, middle segment bare, top segment with 3 elements; endopod 1-segmented, with 3 apical setiform elements and one outer spinula; a possible sexual dimorphism is seen in the armature of the female endopod, which bears 2 apical setae and 2 short, outer spinules.

P3 (male), large and stout, apex modified into a pincer-like structure; 2 sets of setulae on the inner and outer side of the basal segment. P3 (female): exopod 2-segmented, with 2 spines on the top segment and one, subapical outer spine on the basal segment; endopod reduced to a small segment bearing a very small, subapical spine.

P4 (male): Exopod 3-segmented, basal segment with one, well developed outer, subapical spine, mid-

dle segment bare, top segment with 2 apical elements; endopod consisting in one stout, pointed element; a strong thorn element is implanted on the inner side of the basipodite. P4 (female): exopod as in male; endopod longer and narrower, bearing 2 lateral, short spines.

P5 (male): a subtriangular plate, set with spinules along its inner margin; 3 setae of different length on the outer margin. P5 (female): triangular shape more pronounced than in male; inner margin without armature, outer margin as in male.

## Etymology

Named after the ancient spring divinity: Kalypso.

## Affinities

*P. kalypso* n.sp. clearly belongs to the *proserpina*-group of species (Lang, 1948), and seems to be most closely related to *P. prope proserpina* Chappuis (Cottarelli, 1972), widespread in groundwaters of central and southern Italy, and to *P. ruffoi* Chappuis, reported from hyporheic networks of Veneto (north Italy).

The new species differs as follows: from the former in the construction and armature of the male P3 and P4, and in the armature of the endopod of female P3 and P4; from the latter in the construction and armature of the male P2 and P3, and in the morphology of furcal rami.

From the other its congeners, *P. kalypso* n.sp. is easily distinguished mostly by the construction and peculiar armature of male P3.

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